Specialist Summary Table 1 – Program Descriptions 8/8/03
Steve Katz - editor

Type of Monitoring	Lit. Reference	AREMP	PIBO	FCRPS BO Monitoring Guidelines	Washington Comprehensive Monitoring Strategy	California	OWEB/ODFW	Summary Comparison
Source	Source: MacDonald et al., (1991)	Lanigan e-mail	PIBO Web page, Kershner et al., (2003)	Hillman and Giorgi (2003)	Washington CMS	Currently waiting for info)	Oregon Salmon Plan Monitoring Framework, App. B	S. Katz
Ecologically & Scientifically Based Monitoring								
Baseline Monitoring	Baseline monitoring is used to characterize existing water quality conditions, and to establish a database for planning or future comparisons. The intent of baseline monitoring is to capture much of the temporal variability of the constituent (s) of interest, but there is no explicit end point at which continued baseline monitoring becomes trend monitoring (its status monitoring when we don't take the trouble to define the questions first). Those who prefer the terms "inventory monitoring" and "assessment monitoring" often define them such that they are essentially synonymous with baseline monitoring. Others use baseline monitoring to refer to long-term trend monitoring on major streams (eg., Potyondy, 1980).	Not Defined	Not Defined	Baseline monitoring is used to characterize existing or undisturbed conditions, and to establish a database for future comparisons. The intent of baseline monitoring is to capture temporal variability of the parameters of interest. There is no explicit end point at which continued baseline monitoring becomes trend monitoring. Frequency: Low; Duration of Monitoring: Short to Medium; Intensity: Low to Moderate	Monitoring which describes conditions or status at a specific point in time. A baseline may be defined as an historical or other reference condition at a particular time.		Baseline Monitoring is designed to characterize existing or undisturbed conditions for comparison with other monitoring activities. This type of monitoring can be useful as a starting point for other monitoring efforts (especially trend monitoring, project monitoring, and effectiveness monitoring). Sites for baseline monitoring must be carefully selected to ensure they are representative of the conditions with which they will be compared. Upstream monitoring is often used to set baseline for temperature changes observed downstream. However, because many factors influence temperature through a reach, before and after monitoring, or temporal baseline monitoring can greatly strengthen interpretation of results.	One-time probibalistic sample or census survey to evaluate current conditions or status. For fish "Status" is the measure of population health which includes abundance, as well as spatial and genetic structure.

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Status Monitoring/ Trend Monitoring	In view of the definition of monitoring, this term is redundant. Use of the adjective “Trend” implies that measurements are made at regular, well-spaced time intervals in order to determine the long-term trend in a particular parameter. Typically the observations are not taken specifically to evaluate management practices (as in type 4), management activities (as in type 5), water quality models (as in type 6) or water quality standards (as in type 7), although trend data may be utilized for one or all of these other purposes.	Question: Determine if the Northwest Forest Plan (NFP) is restoring and maintaining aquatic and riparian ecosystems on federal lands in the Forest Plan area? Use an EMDS model to determine a watershed condition value for each HUC. Assess the effectiveness of the NFP by looking at the distribution of the 250 HUCs. Identify attributes that are limiting condition values for each HUC. Sampling Design: Rotating Panel. Set of 50 Randomly sampled 6th HUCs each year. Repeat the selection of 50 each year. After 5 years 250 are selected, and the panel repeats in year 6. AREMP used similar ODFW design. Picked managed and unmanaged watersheds to see if they can detect differences over time. Only use complete 6th fields (don’t use composites). Use index of watershed condition based on response reach.	Question: 1) Determine whether a suite of Biological and physical attributes, processes and function of upland, riparian and aquatic systems are being degraded, maintained, or restored across the PIBO landscape. 2) Determine the direction and rate of change in riparian and aquatic habitats over time as a function of management practices. 3) Determine if specific "Critical Riparian Area (CRA)" practices related to livestock grazing are maintaining or restoring riparian vegetation structure and function. (Called "Effectiveness monitoring" page 12 of "A plan to monitor the Aquatic and Riparian Resources in the Area of PACFISH/INFISH and BO...") Sampling Design: Rotating Panel. The sampling units are 177 blocks each of which is composed of 20 watersheds. 20% of the 177 blocks are randomly selected, and 7 of the watersheds within each of those blocks are subsampled Rotating panel sampling scheme. 6th HUCs each year for 5 years (250 total) + 10 HUCs sampled every year and then repeat sequence. (>50% federal land; 1 site in each HUC at	Trend monitoring involves measurements taken at regular time intervals in order to assess the long-term trend in a particular parameter. Usually, the measurements are not taken specifically to evaluate management practices. Rather, they serve to describe changes in the parameter over time. Status monitoring will quantitatively measure the "population status" of endangered salmonids in the Northwest Region. Population status = abundance, trend in abundance (8), spatial structure, genetic diversity. Frequency: Low; Duration: Short to Medium; Intensity: Low to Moderate Design: Tessellated sampling scheme like EMAP. There is no specification of numbers of samples or required spatial or temporal resolution. Indicators and Field protocols as per Moore et al (1997) and EMAP, EPA etc. Products are check-in evaluations in 2003, 2005, 2007.	Status monitoring refers to an inventory of conditions in a defined geographic area summarized for a particular time. Trend monitoring is used to track the variability and change of a particular parameter over a period of time as needed to meet objectives, on either a short or long time frame. Addresses the question: How are key habitat, water, and fish indicators changing over time? Extensive (status and trends) monitoring - The objective is to estimate fish populations, generally at the ESU scale, and to track indicators of habitat, water quality, water quantity, and other factors that impact wild fish. The spatial scale is large and varies from ESU (for fish population estimates) to statewide. This design will not demonstrate cause-effect relationships between actions and outcomes, but is an effective means of assessing the actual condition of variables. For example, the current frequency distribution of large woody debris or pool depth within an ESU could be assessed and tracked over time to determine the net impact of natural events and management actions (programmatic effectiveness). These estimates of fish abundance and distribution are the ultimate measure of the effectiveness of salmon recovery efforts as they account for the net effect of natural events and management actions.		Question: What is the condition of salmon populations at the ESU, Sub-Basin and watershed scale? What is the condition and capacity of aquatic habitat and watershed systems? This monitoring type (trend) requires the development of a record over time(usually more than 5 years). Sites must be established which are stable and not impacted by ancillary factors. For example, if the purpose for monitoring is to determine the long term trend in stream temperature with recovery of riparian shade following a wildfire, then monitoring sites would need to be located downstream of the wildfire site. But monitoring sites would also need to be positioned where changing influences, like a new upstream reservoir (which could control temperature by regulating flows and the temperature of the water released), can be avoided or accounted for in the monitoring plan. Measurement methods must also be "repeatable" over the monitoring period.	Serialized probibalistic sampling or census survey to detect both current status and the trend in status. Trend menas the change in status over time. Therefore, trend monitoring includes some commitment to monitor at regular intervals to evaluate the temporal varience structure to the parameters monitored-ergo "serialized". This sort of monitoring must also be probibalistic in order to evaluate the spatial varience of the estimators of status. This component of the definition excludes certain abundance estimators that do not allow the calculation of confidence intervals, such as some index count approaches. In general, the study design decisions, such as frequency and spatial scale of sampling, are based on demographic characteristics of the relevant study species. This definition is also based on the proximal need to get an estimate for status and the trend in status - independant of larger programmatic questions that may be addressed with the data. This allows for trend monitoring to evaluate "effectiveness" questions if those questions address programmatic actions that cover larger or longer scales than are relevant to the response variables - such as the fresh water life cycle of single fish or small groups of fish.

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			lowest unconstrained reach aka response reach; only use HUCs with a <3% response reach; Picked managed and unmanaged watersheds to see if they can detect differences over time; Only use complete 6th fields (don't use composites); Use index of watershed condition based on response reach.					
Effectiveness Monitoring	While implementation monitoring is used to assess whether a particular activity was carried out as planned, effectiveness monitoring is used to evaluate whether the specified activities had the desired effect (Solomon, 1989). Confusion arises over whether effectiveness monitoring should be limited to evaluating individual BMPs, or whether it also can be used to evaluate the total effect of an entire set of practices. The problem with this broader definition is that the distinction between effectiveness monitoring and other terms, such as project or compliance monitoring, becomes blurred. To minimize confusion within this document, effectiveness monitoring will be used in the narrow sense of evaluating individual management practices, particularly BMPs (Section 1.4). Monitoring the effectiveness of individual BMPs, such as the spacing of water bars on skid trails, is an	Question(s): Has the ACS been effective at maintaining and restoring the ecological integrity of watersheds on public lands? Has the condition of watersheds been maintained or improved since the implementation of the ACS? What is the status and trend in upslope processes as indicated by vegetation, roads and stream crossings, and landslides in the watershed? What is the status and trend in riparian processes as indicated by vegetation and roads? What is the status and trend in in-channel processes as indicated by channel morphology, habitat, and biological characteristics? Area: Northwest Forest Plan Who does the monitoring?: Aquatic and Riparian Effectiveness Monitoring Program (AREMP) Data: Raw data is available to other agencies (Access	Question: Are key biological and physical attributes, processes, and functions of aquatic and riparian zones different between managed watersheds and reference watersheds? Question: Are the distributions of variables within these watersheds approaching each other over time? Product: Comparison of managed to unmanaged watersheds. Sample Design? Random sample of 250 6th HUCs each year for 5 years (250 total) + 10 HUCs sampled every year and then repeat sequence. (>50% federal land; 1 site in each HUC at lowest unconstrained reach aka response reach; only use HUCs with a <3% response reach; Picked managed and unmanaged watersheds to see if they can detect differences over	Effectiveness monitoring evaluates whether the management activities achieved the desired effect or goal. Success may be measured against "controls," "baseline conditions," or "desired future conditions." Project monitoring, a type of effectiveness monitoring, addressed the effectiveness of a particular project and the combination of measures used to protect aquatic habitat. Frequency: Medium to High; Duration of Monitoring: Short to Medium; Intensity: medium The design of Effectiveness Monitoring is distinct from Status Monitoring as a consequence of the requirement for unique questions within each effectiveness study. In status monitoring the questions are broadly defined and the design process is dominated by	Effectiveness monitoring determines whether the management practices employed by a project or management action met its stated objectives. Addresses the question: Did the action meet it objectives? Projects are defined at a small scale, with defined sets of actions meant to protect or enhance specific habitat features or habitat-forming process. Implementation monitoring and effectiveness monitoring are equally important in meeting the objectives of project effectiveness monitoring. An enhancement technique may be difficult to implement properly, but very effective or, conversely easy to implement but rarely effective. Both implementation and effectiveness monitoring are necessary to evaluate specific projects or classes of projects. Because these are small-scale projects, their impacts will generally be local and the indicators monitored should be selected accordingly. *(i.e.*		Effectiveness monitoring is used to determine whether properly implemented control practices work. An example of the (*sic*) effectiveness monitoring is the stream temperature monitoring conducted as part of the Alsea Watershed study to determine the effectiveness of forest buffers in minimizing increases in stream temperature following logging (Brown, 1970). The ODF (1994) protocols are specifically designed to develop information to assess the effectiveness of the forest practice rules for riparian areas to meet temperature goals. *(i.e. programmatic effectiveness)*	Effectiveness monitoring is performed within an experimental design that tests one of the following questions where "effective" means that the actions had the desired effect on the habitat as well as the target species: 1) was a specific implementation of a management or recovery action effective? *(=project effectiveness)* 2) were classes of management or recovery actions effective? *(=project effectiveness)* 3) were groups of potentially diverse management or recovery actions effective on scales relevant to spatial or demographic units? *(=programmatic effectiveness)* In general, the study design for this type of monitoring is dominated by experimental design issues, rather than statistical sampling design issues as is the case for trend or status monitoring. In particular, the effectiveness of actions must be evaluated in the context of temporal and

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	important part of the overall process of controlling non-point sources of pollution (Section 1.4 of Chapter 2). However, in most cases the monitoring of individual BMPs is quite different from monitoring to determine whether the cumulative effect of all BMPs results in adequate water quality protection. Evaluating individual BMPs may require detailed and specialized measurements best made at the site of, or immediately adjacent to, the management practice. Thus effectiveness monitoring often occurs outside of the stream channel and riparian area, even though the objective of a particular practice is intended to protect the designated uses of a water body. In contrast, monitoring the overall effectiveness of BMPs usually is done in the stream channel and it may be difficult to relate these measurements to the effectiveness of individual BMPs.	2000 database) by contacting Chris Moyer (541.750.7017). Sample design? Random spatial selection of 50-6th (7th?) field watersheds each year for 5 years (= total of 250 watersheds) Protocol: 20 upslope, riparian, and in-channel attributes measured Analytical Frame: Develop fuzzy curves for each attribute based on literature, state/federal data sets, and provincial expert opinion. Use Ecosystem Management Decision Support (EMDS) system to determine each watershed's condition. All parameters at the reach scale are aggregated into an overall "reach condition" score. The reach condition scores are combined with watershed-level data parameters (e.g. upslope and riparian vegetation composition) to calculate a score for watershed condition.	time; Only use complete 6th fields (don't use composites); Analytical Frame: Use index of watershed condition based on response reach. - Not known if this is best way to characterize reach.).	statistical sampling concerns; in effectiveness Monitoring the questions are unique and the design is dominated by experimental design concerns.	*experimental design concerns dominate)*			spatial variance. Which is to say, controls must be appropriately defined so that contrasts are real manifestations of differences between treatment areas where the actions are and appropriate control areas where the actions are not.
Validation Monitoring	Since the issue of validating water quality standards is beyond the scope of this document, validation monitoring in the Guidelines is discussed primarily with regard to the quantitative evaluation of a proposed water quality model to predict a particular water quality	Not Defined	Not defined	Validation monitoring assesses the performance of a model or standard. It questions whether the underlying management assumptions and models are correct. Frequency: High; Duration: Medium to Long; Intensity: High	Validation monitoring measures and explores cause and effect relationships and the dynamics of cumulative effects. Attempts to verify the validity of assumptions and predictions formulated through effectiveness monitoring and modeling. Addresses the question: Were expected biotic (fish)		This type of Monitoring is used to assess the performance of a model or standard. A validation study might be designed to monitor fish populations and stream temperature simultaneously for a variety of conditions to determine whether the	Validation monitoring is designed to address the question: Did the implemented action or actions have the ***predicted*** consequences? Validation monitoring is appropriate where there are either quantitative or qualitative consequences from

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	parameter. In keeping with the basic principles of modeling (e.g. James and Burges, 1982), the data sets used for validation should be different from the data sets used to construct and calibrate the model. This separation helps ensure that the validation data will provide an unbiased evaluation of the overall performance of the model. The intensity and type of sampling for validation monitoring should be consistent with the output of the model being tested.				responses achieved?This category is more research oriented than the other two types of monitoring and is tailored to establish “cause and effect” relationships between fish, habitat, water quality, water quantity, and management actions. It pertains to evaluation of programs that conduct, promote, or regulate, activities meant to protect or enhance habitat, water quality, or fish production. One example of intensive monitoring might be a case study of a watershed that examines the cumulative impacts of forest practices on the freshwater life-stages of a species of salmon. Another example might study of the impacts of a particular hatchery on a specific salmon run. The common theme of these studies is to develop an understanding of the linkage between management actions and the resource. These studies often require measuring many parameters to detect the variable affecting change.		current water quality standards provide appropriate protection and whether assumed relationships between fish and temperature are valid.	actions specific to the actual implementation. The expectation is that some prior modeling effort, or experience from previous similar implementations has created a "target" result that when achieved the action can be declared a success and monitoring resources applied to other problems. Validation monitoring is largely a documentation, rather than a hypothesis testing, activity. As such, it is not anticipated to be accompanied by parallel monitoring at reference or control sites.

Management & Administrative Based								
Compliance Monitoring	This is the monitoring used to determine whether specific water-quality criteria are being met. The criteria can be numerical or descriptive. Usually the regulations associated with individual criterion specify the location, frequency, and method of measurement.			This type of monitoring determines whether specified criteria are being met. The criteria can be numeric or descriptive. Generally, regulations associated with individual criterion specify the location, frequency, and method of measurement.[1] Frequency: Variable Duration of Monitoring: Depends on Project Intensity: Moderate to High	Compliance monitoring is used to determine whether a specific environmental standard, regulation, or law is met.		Compliance monitoring is special type of effectiveness monitoring to determine whether specific performance standards are met. For stream temperature, compliance monitoring would be designed to determine whether stream temperature increase follows upstream management approaches or exceeds water-quality standards. The location, frequency and methods of measurement may be specified as part of the standard. *(The standard defines the spatial and temporal scale - an administrative agenda)*	Compliance monitoring is special type of validation monitoring to determine whether specific performance standards, environmental standard, regulation, or law is met. The specific standards may be administratively based, or conservation biologically/ecologically based, but the activity of Compliance monitoring addresses the standard rather than testing hypotheses. The location, frequency and methods of measurement may be specified as part of the standard. (The standard defines the spatial and temporal scale - an administrative agenda) In most cases standards are based on some number, or single "key indicator" and so the monitoring often consists of measuring a single indicator. This focus differentiates Compliance monitoring from more comprehensive Effectiveness monitoring.
Implementation Monitoring	This type of monitoring assesses whether activities were carried out as planned. The most common use of implementation monitoring is to determine whether Best Management Practices (BMPs) were implemented as specified in an environmental assessment, environmental impact statement, other planning document or contract. Typically, this is carried out as an administrative review and does not involve any water quality	Questions: Are Riparian Reserves achieving the desired goals of maintaining and restoring the structure and function of riparian systems, providing connectivity within watersheds, and providing transition zones between aquatic systems and upslope areas? Are Key Watersheds achieving the desired goals of providing high		This type of monitoring assesses whether activities were carried out as planned. This is generally carried out as an administrative review and does not require any parameter measurements. This type of monitoring cannot directly link management actions to physical/environmental responses, as no physical/environmental parameters are measured. Frequency: Variable;	Implementation monitoring determines whether an activity was performed and/or completed as planned. Implementation and compliance monitoring addresses the questions: Are management actions consistent with objectives and plans? Are standards being met?		This type of monitoring assesses whether activities were carried out as planned. The most common example of this monitoring as an assessment of Best Management Practices (BMP) or forest practice rule implementation. Implementation monitoring of stream temperature response might focus on determining whether the forest practice rules for shade retention are being met.	Implementation monitoring determines whether an activity was performed and/or completed as planned. The role of expectations, implicit in the phrase "as planned", requires that implementation monitoring be accompanied by a plan that sets out those expectations and that the data collected in this type of monitoring be referenced to those expectations--"% of riparian corridor identified in the project plan that was actually fenced."

	measurements. Implementation monitoring is one of the few terms which has a relatively widespread and consistent definition. Many believe that implementation monitoring is the most cost-effective means to reduce non-point source pollution because it provides immediate feedback to the managers on whether the BMP process is being carried out as intended (Section 1.4). On its own, however, implementation monitoring connot directly link management activities to water quality, as no water quality measurements are being made.	quality of water and habitat for at-risk fish species? Did Watershed Analyses guide development of management practices that meet or do not retard attaining the ACS's objectives in watersheds? Was watershed restoration implemented as a comprehensive, long-term program to restore watershed and aquatic ecosystem health, including the habitats supporting fish and other aquatic- and riparian-dependent organisms? Area: Northwest Forest Plan		Duration of Monitoring: Duration of project; Intensity: Low				Implementation and compliance monitoring addresses the questions: Are management actions consistent with objectives and plans? Are standards being met?
Project Monitoring	This type of monitoring assesses the impact of a particular activity or project, such as a timber sale or construction of a ski run on water quality. Often this assessment is done by comparing data taken upstream and downstream of the particular project, although in some cases, such as in a fish habitat improvement project, the comparison may be on a before and after basis. Because such comparisons may, in part, indicate the overall effectiveness of the BMPs and other mitigation measures associated with the project, some agencies consider project monitoring to be a subset of effectiveness monitoring. Again the problem is that water quality is a function of more than the effectiveness of the BMPs	Not Defined	Not Defined	Not Defined	Project monitoring, a type of effectiveness monitoring, addresses the effectiveness of a particular project of classes of projects.		Project monitoring looks at the effectiveness of a particular project and the combination of measures used to protect water quality. Effectiveness monitoring requires that the conditions influencing performance be assessed and that control measures be properly implemented.	Project monitoring determines some of the biographical information on projects. Biographical information includes general components such as: 1) Who is performing the project? 2) What is the project actually designed to do? 3) Where explicitly is the project, or its component parts? 4) What is the time table for the project? Project tracking is likely far more detailed than these generic question categories, but generally addresses the characteristics of the projects - rather than the characteristics of the project consequences. Different from Implementation monitoring, there is no role for

	associated with the project.							expectations. Therefore, one might collect data of the type -- "miles of riparian corridor fenced."

Specialist Summary Table 2 – Monitoring Program Attributes 8/8/03
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	AREMP	FCRPS BO Monitoring Guidelines	PIBO	Washington Comprehensive Monitoring Strategy	Washington DEQ	OWEB/ODFW	Oregon DEQ
Objective	Determine if the Northwest Forest Plan (NFP) is restoring and maintaining aquatic and riparian ecosystems on federal lands in the Forest Plan area?	1) What are the distributions, abundances, age structures, genetic diversity, and growth rates of Columbia River Basin (CRB) fish populations relative to the status of their habitat and also performance standards or objectives for both? and 2) What is the effect of specific categories of AA off-sight mitigation actions on the survival of ESA fish?	Are key biological and physical attributes, processes, and functions of aquatic and riparian zones different between managed watersheds and reference watersheds? Are the distributions of variables within these watersheds approaching each other over time?		Required to report on condition of waters o Stream reach or length, e.g., how many miles are on 303(d) list?	What is the condition of salmon populations at the ESU, Sub-Basin and watershed scale? What is the condition and capacity of aquatic habitat and watershed systems? What constitutes detectable and meaningful changes in populations and habitat condition?	
Attributes/Indicators w/ Protocols (see spreadsheet)	In-channel (biological, physical, chemical), riparian, and upslope.	Density of woody debris pieces Density of woody debris volume Density of key woody debris pieces Density of wood jams Density of deep pools % pool area Density of riparian conifers % channel shading	In-channel (biological, physical, chemical), riparian, and upslope.		Habitat Condition: channel morphology, riparian vegetation, human disturbance activities, substrate, fish cover. Water quality and quantity: e.g., temperature, DO, pH, flows .	Salmon: abundance, geographic distribution, life history, diversity, and productivity Biotic Condition: invertebrate communities, riparian vegetation, toxics. Habitat Condition: channel morphology,	Biotic Condition: invertebrate and fish communities Habitat Condition: channel morphology, riparian vegetation, human disturbance activities, substrate, fish cover. Water quality and

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		% substrate area with fine sediments % substrate area with gravel Redd or weir adult counts Age class of spawners Hatchery fish spawning wild Parr density/size Parr PIT tagging/size Resident parr abundance Emigrant parr & smolt abundance/size			Protocols are consistent with EPA environmental monitoring and assessment program (EMAP).	hydrology, fish passage. Water quality and quantity: e.g., temperature, DO, pH, flows .	quantity: e.g., temperature, DO, pH, flows .
Sample Design	Random sample of 50 6th HUCs each year 50 1st year 50 2nd year 50 3rd year 50 4th year 50 5th year 250 total and then repeat sequence. · >25% of the stream length w/in watershed is in federal ownership. · Random reaches w/in HUC (as many as can be done in 8 days = 4-10) 1:100K 80 points identified randomly using an EMAP approach.	(Pilot Program in 3 Sub-basins: Wenatchee, John Day, Upper Salmon) 50 sites drawn on an annual basis for each would be assigned to the rotating panel design as follows: · 3 panels with different repeat intervals · 17 of the sites will be sampled every year · 16 sites will be allocated to a 4 year rotating panel (sites visited once every 4 years on a staggered basis) · 17 sites will be new sites each year Sampled reaches will be lowest "Response reach" (<3% gradient) within chosen HUC, unless	Random sample of 250 6th HUCs each year for 5 years (250 total) + 10 HUCs sampled every year and then repeat sequence. · >50% federal land · 1 site in each HUC at lowest unconstrained reach aka response reach o only use HUCs with a <3% response reach · Picked managed and unmanaged watersheds to see if they can detect differences over time · Only use complete 6th fields (don't use composites). · Use index of watershed condition based on response reach. - Not known if this is best way to characterize reach.	The overall status of habitat in Washington has not been measured with a systematic scientific approach. One of the greatest needs for a comprehensive strategy is the ability to say with some degree of certainty that changes in habitat conditions can be measured and correlated to the recovery of salmon populations within their respective salmon recovery regions. The Strategy proposes using the US Environmental Protection Agency's EMAP approach to sampling. This consists of a series of 50 randomly selected sites in each salmon recovery region sampled on an annual basis as a rotating	WA DEQ currently have no surveys o Pick outlets of major basins and install long-term monitoring water chemistry sites. · Macroinvertebrates: Doing about 20 site visits now per year, we continue to add new sites and are just starting to visit some of our sites for a second time. Through this monitoring we hope to reveal changes in streams that may occur from forest and agricultural practices, urbanization, or other controllable sources of impact.	Targeted for coho 3-year life cycle · count adult spawners in streams · revisit sites on pattern based on 3 years · 4 panels: 25% for each year 1. 25% visited every year – trend detection. 2.visited every 3 years (1,4,7) – adds to trend capabilities. 3. visited every 9 years – adds to trend capabilities. 4. visited only once (new set of sites each year) – gives info on more sites (status), doesn't provide any thing for trend. · Each site falls within a 6th HUC · Will visit all sites within 27 years. · 100-120 adult sites within each of 5 gene	**OR DEQ** is monitoring a subset of the ODFW habitat sites. o Random sample design at the ESU scale o Current sampling focused in Coast and Willamette ESUs, and John Day/Lower Deschutes sub-basins. o Long-term monitoring objectives to measure status and trends of biotic, habitat and water chemistry parameters. o Also have identified regional "reference" sites to establish possible targets or expected conditions for biological and habitat parameters.

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		none available then lowest "Transition reach" (3%> Gradient >5%) will be chosen.		panel. This sample design will detect with 90% confidence a 10% or greater change in freshwater habitat within the salmon recovery region. The strategy would employ additional stratification of sample sites based upon eco-province and possibly anadromous and non-anadromous waters.		conservation areas. · 50 juvenile sites. · Upslope and riparian characterized similar to AREMP, but only at one site at lower end. · Watershed health sampling design not yet determined. · Watershed health sampling design not yet determined.	
Product/Report	· Use an EMDS model to determine a watershed condition value for each HUC. Assess the effectiveness of the NFP by looking at the distribution of the 250 HUCs. · Identify attributes that are limiting condition values for each HUC.	2000 FCRPS Biological Opinion has mandated evaluations in 2003, 2005 & 2008 for success in achieving programmatic goals listed above: 2003 - review of programmatic implementation. 2005 - review of data to evaluate likelihood of programmatic success. 2008 - review of programmatic success.	Comparison of managed to unmanaged watersheds.		o 305(b) reports, 303(d) listings, specific project documents, technical criteria-related documents		Report on status and trends in key parameters related to biological condition, habitat condition, and water quality. · Required to report on condition of waters o Stream reach or length, e.g., how many miles are on 303(d) list?